CBCS SCHEME

USN | | | | | | | | | | |

17EE43

Fourth Semester B.E. Degree Examination, June/July 2019
Transmission and Distribution

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. List the advantages to transmit power at high voltage with explanation. **(07 Marks)**

b. The towers of height 30m and 90m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500m. If the tension in the conductor is 1600kg, find the minimum clearance of the conductor and water and clearance mid-way between the supports. Weight of conductor is 1.5kg/m. Bases of the towers can be considered to be at water level. **(07 Marks)**

c. List the methods of improving string efficiency and explain any one method with a neat sketch. **(06 Marks)**

OR

2 a. With a neat diagram, explain feeders, distributor and service main of a distribution system. **(06 Marks)**

b. A transmission line conductor having a diameter of 19.5mm weighs 0.85 kg/m. The span is 275 metres. The wind pressure is 39 kg/m^2 of projected area with ice coating of 13mm. The ultimate strength of the conductor is 8000kg. Calculate the maximum sag if the factor of safety is 2 and ice weighs 910 kg/m^3. **(07 Marks)**

c. A string has 3 units and each unit has a capacitance C. The pin to earth capacitance is C/10. Determine the values of voltage across each unit of the string and the string efficiency. **(07 Marks)**

Module-2

3 a. Derive an expression for the inductance of a conductor due to internal flux. **(08 Marks)**

b. The three conductors of a 3-phase transmission line are arranged in a horizontal plane and are 3 meters apart. The diameter of each conductor is 4cm. Determine the inductance per km of each phase. Assume balanced load and R, Y, B phase sequence. **(07 Marks)**

c. The three conductors of a 3-phase line are arranged at the corners of a triangle of sides 2m, 2.5m and 4.5m. Calculate the inductance per km of the line when the conductors are regularly transposed. The diameter of each conductor is 1.24cm. **(05 Marks)**

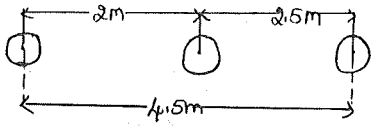
OR

4 a. Derive an expression for the line to neutral capacitance for a 3-phase overhead transmission line when the conductors are unsymmetrically spaced. **(10 Marks)**

b. A single-phase transmission line has two parallel conductors 3 metres apart, radius of each conductor being 1cm. Calculate the capacitance of the line per km. Given that $\epsilon_0 = 8.854 \times 10^{-12}$ F/m. **(04 Marks)**

c. A 3-ϕ, 50Hz, 66kV overhead line conductors are placed in a horizontal plane as shown in Fig.Q.4(c). The conductor diameter is 1.25cm. If the line length is 100km, Calculate: i) Capacitance per phase ii) Charging current per phase, assuming complete transposition of the line. Given $\in_0 = 8.854 \times 10^{-12}$. **(06 Marks)**

Fig.Q.4(c)



Module-3

5 a. Explain the nominal π method for obtaining the performance calculations of medium transmission line. Draw the corresponding vector diagram. **(10 Marks)**

b. A 3-ϕ line delivers 3600 kW at a pf 0.8 lagging to a load. If the sending end voltage is 33kV, determine: i) The receiving end voltage ii) Line current iii) Transmission efficiency. The resistance and reactance of each conductor are 5.31Ω and 5.54Ω respectively. **(07 Marks)**

c. Define voltage regulation. **(03 Marks)**

OR

6 a. Derive an expression for sending end voltage and current for long transmission line using rigorous solution. **(10 Marks)**

b. Two transmission lines having generalized circuit constants A_1, B_1, C_1, D_1 and A_2, B_2, C_2, D_2 are connected in series. Develop expressions for the overall constants ABCD of the combination in terms of A_1, B_1, C_1, D_1 and A_2, B_2, C_2, D_2. **(06 Marks)**

c. Explain Ferranti effect. **(04 Marks)**

Module-4

7 a. Explain the phenomenon of corona in overhead transmission line. **(06 Marks)**

b. A 132kV line with 1.956 cm diameter conductors is built so that corona takes place if the line voltage exceeds 210kV (rms). If the value of potential gradient at which ionization occurs can be taken as 30kV per cm, find the spacing between the conductors. Assume 3-ϕ. **(06 Marks)**

c. Derive the expression for the potential difference between core and earthed sheath in capacitance grading. **(08 Marks)**

OR

8 a. List the advantages and disadvantages of corona. **(05 Marks)**

b. A single core cable of conductor diameter 2cm and lead sheath of diameter 5.3cm is to be used on a 66 kV, 3-phase system. Two inter sheaths of diameter 3.1cm and 4.2cm are introduced between the core and lead sheath. If the maximum stress in the layers is the same, find the voltages on the inter sheaths. **(10 Marks)**

c. Write a note on inter sheath grading. **(05 Marks)**

Module-5

9 a. Explain the radial feeders used in distribution system. **(05 Marks)**

b. Explain the secondary distribution system: i) 3-ϕ distribution ii) Single phase two wire system. **(10 Marks)**

c. Write a note on power quality. **(05 Marks)**

OR

10 a. Explain the ring main or loop feeders in distribution system. **(06 Marks)**

b. Define: i) Reliability ii) Availability iii) Adequacy iv) Security. **(08 Marks)**

c. Write a note on limitations of distribution systems. **(06 Marks)**

* * * * *